

FACT SHEET

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

NPDES Permit Number: WA 000026-4

FACT SHEET -- APPLICATION FOR RENEWAL OF NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE POLLUTANTS TO STATE WATERS PURSUANT TO THE PROVISIONS OF CHAPTER 90.48 REVISED CODE OF WASHINGTON AND THE FEDERAL WATER POLLUTION CONTROL ACT AS AMENDED.

Applicant: Boise Cascade Corporation
Vancouver Facility
P.O. Box 690
Vancouver, WA 98666

The Department of Ecology (Ecology) is proposing to reissue a permit to discharge to the above listed applicant, subject to certain effluent limitations, which require treatment facilities, schedules of compliance, and other conditions necessary to carry out the provisions of state and federal law.

PUBLIC COMMENT AND INFORMATION

There will be a 30 day public comment period as required by 40 CFR 124.10. Interested persons may submit written comments regarding the proposed permit. All comments should be submitted by May 12, 2000, if they are to be considered in the formulation of final determinations regarding this application. Comments should be sent to:

Robert D. Carruthers
Washington State Department of Ecology
Industrial Section
P.O. Box 47600
Olympia, Washington 98504-7600
Phone: 206-407-6954

The application, proposed permit, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 4:30 p.m. weekdays at the aforementioned Ecology location. In addition, a copy of the proposed permit, Public Notice and Fact Sheet are also available for inspection at the Vancouver Community Library, 1007 E. Mill Plain Boulevard.

GENERAL INFORMATION

Location: The facility is located on the shore of the Columbia River at 907 W. Seventh Street, Vancouver, Washington, just downstream from the I-5 highway bridge between Washington and Oregon.

Activity: The facility is currently considered a “converting facility” involved in converting uncoated papers to coated and security papers. No pulping, digesting, or bleaching activities occur at this site. Current facility activities consist of a capsule plant (maximum production of 9200 lbs/day), a coater (maximum production of 120 tons/day), and printing presses (maximum production of 23 tons/day). The capsule plant manufactures a coating which is both marketed as a product and used in the facility’s coating operation to make carbonless paper. The printing presses embed such features as “water marks” on paper where integrity is an issue such as financial documents.

Receiving Waters: Columbia River; Class A water quality.

Discharge Location: The facility discharge outfall extends from the facility site about 311 feet in a southwesterly direction into the Columbia River, at river mile 106. The outfall formerly extended into the Columbia about 500 feet but damage at the 311 foot point has rendered the remaining outfall length unavailable. Discharge characteristics as a result of the new outfall configuration were evaluated during this permit reissuance.

Discharge Description: The facility discharges via a 36-inch pipe at the above noted location. Facility discharge receives treatment in a stabilization basin. The discharge currently is on a periodic batch basis. Treated effluent is discharged whenever the treatment pond volume reaches a set level. Discharge volume is much lower in the summer compared to the wetter winter season. Major pollutants are 5-day biochemical oxygen demand and total suspended solids.

Permit Conditions: All known, available, and reasonable methods to control toxicants in the applicant's wastewater shall be used. Federal effluent guidelines do not exist for “converting” activities. As such the effluent limitations of this permit are based on Best Professional Judgement (BPJ). This means that BOD and TSS effluent limitations have been set based on a review of effluent characteristics from 1998 through 1999. No discharge of toxicants will be allowed that would violate water quality standards, including toxicant standards, sediment criteria, and dilution zone criteria, as referenced in RCW 90.48.520.

If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act for a toxic pollutant, and that standard or prohibition is more stringent than any limitation upon such pollutant in the permit, the Department shall institute proceedings to modify or revoke and reissue the permit to conform to the more stringent effluent standard or prohibition.

Compliance Record: No formal enforcement action for effluent limit noncompliance has been initiated by Ecology toward Boise Cascade - Vancouver in the last 5 years. A \$1000 penalty was assessed in March of 2000 for failure to submit, on a timely basis, several Permit documentation requirements.

The two major issues were the delayed outfall evaluation and tardy submittal of the NPDES renewal application. All outstanding administrative issues were addressed by the facility as of March 27, 2000. Ecology does not believe any environmental harm occurred as a consequence of these events nor does the facility appear to have gained any economic advantage. The intent of Ecology's formal enforcement action was to encourage the Permittee to pay closer attention to the administrative details of its Permit.

TECHNICAL INFORMATION

Discharge Description:

The effluent limitations in the draft renewal permit are based on effluent characteristics reported in the monthly Discharge Monitoring Reports covering 1998 through 1999. A summary of these parameters is presented in Appendix A of this Fact Sheet.

Receiving Water Quality Standards:

The applicable receiving water quality standards are those adopted by the Washington State Department of Ecology and approved by the EPA Regional Administrator pursuant to Section 303 of the Federal Water Pollution Control Act Amendments and WAC 173-201A. The Columbia River is designated a Class A waterway from the mouth to the Grand Coulee Dam. Characteristic water uses include fishery and wildlife habitat, general recreation and aesthetic enjoyment, and navigation. Compliance with the permit conditions should not result in degradation of water quality or impair any beneficial uses.

The primary water quality standard parameters that could be affected by the discharge, and the required standard, are as follows:

- 1). Dissolved oxygen shall exceed 90% of saturation.
- 2). No measurable temperature increase (0.3 degrees C) in the receiving water will be permitted.
- 3). Toxic material concentrations shall be below those which may adversely affect characteristic water uses, cause acute or chronic conditions to the aquatic biota, or adversely affect public health.
- 4). Aesthetic values shall not be impaired by the presence of materials or their effects which offend the senses of sight, smell, touch or taste.

Human health based criteria were promulgated for the state by EPA in its' National Toxics Rule (Fed. Reg., V. 57, No. 246, Tuesday, December 22, 1992). Human health criteria have been established for a subset of the chemicals referred to as priority pollutants. Permittees must submit priority pollutant analysis results as part of a permit renewal application. The Department has evaluated whether the Permittee's effluent has a reasonable potential to violate the human health criteria. None of the priority pollutant concentrations reported in the applicant's permit renewal application exceeded their respective human health criteria thresholds. Therefore, the Department is not proposing effluent limits or monitoring for human health criteria during this permit cycle. Evaluation of compliance with human health criteria will be an ongoing activity and the Department's current position may change in the future depending on effluent characteristics.

Basis for Limitations: The Permit is organized into sections identified by alphanumerical headings which run S1 through S9 for facility specific conditions and G1 through G25 for generic conditions present in all state issued NPDES permits. The basis for limitations identifies the federal or state regulations or law which establishes the authority for the permit requirements.

The major sections of Permit WA 000026-4 and the basis for limitations for each major section are identified in Table 1 below. Further explanation of condition S1 follows Table 1.

TABLE 1. MAJOR PERMIT SECTIONS AND BASIS FOR LIMITATIONS.

<u>Section</u>	<u>Basis for limitation</u>
S1. Effluent Limitations	Clean Water Act (CWA) Sec. 402(a)(1), 40 CFR 122, RCW 90.48, Chapters 173-200, 201A, 204, 205 and 220 WAC.
S2. Monitoring and Reporting	CWA, 40 CFR 122, 40 CFR 136, RCW 90.48, RCW 90.56, Chapters 173-50, and 220 WAC.
S5. Solid Waste Disposal	CWA, 40 CFR 122, RCW 90.48.080 and 520, RCW 70.95, Chapter 173-216 WAC.
S7. Spill Plan	40 CFR 122, RCW 90.48, Chapters 173-181, 180D, and 220 WAC.
S8. Outfall Evaluation	CWA, Chapter 173-220 WAC.
G1 through G 25	CWA, 40 CFR 122, RCW 90.48, Chapters 173-201A, 220, and 240.

Further explanation of S1: The effluent limitations proposed for this permit are based on effluent characteristics observed from 1998 through 1999. Summaries of the facility's recent discharge history and effluent characterization are presented in Appendices A and B of this Fact Sheet. The facility currently batch discharges effluent about 2 or 3 times per month determined by treatment pond volume. A brief history of the facility helps in understanding why the Permit limits have changed over time. The paper facility at Vancouver dates back to the turn of the Century. Sulfite pulping was added about 1924. Chlorine and hypochlorite were used as bleaching chemicals until 1968 when the sulfite pulping and bleaching systems were closed down and dismantled. At this same time, the primary clarifier and the aerated stabilization pond were installed. Bleached pulp was barged in from Boise Cascade's St. Helens facility to feed Vancouver's paper machines. A small recycle plant with deinking capability that repulped bleached paper was added in the 1970's and small amounts of hypochlorite was used on the recycle pulp to raise brightness a few points. Paper production was shut down in 1996 and thereafter the facility continued as a converting facility. The applicable SIC as a paper facility is 2611. Paper produced elsewhere is brought onsite and enhanced in value through coating and printing operations. As a converting facility the applicable SIC are 2741 for the printing presses, 2671 for the coating operation, and 2672 for the capsule plant. The resulting high value paper is used for such commodities as stock and security paper. The BOD and TSS effluent load generated from current facility activities is very low

compared to past operations. As a converting facility, effluent consists largely of machine cleanup water which does not have the BOD load associated with digestion of wood chips.

There are not federal effluent guidelines for converting operations as there are for sulfite or kraft facilities. Facility effluent is not strongly correlated to production so typical production based emission factors were not deemed appropriate. Also, facility discharge is on an irregular batch basis making standard statistical methodology less meaningful. The effluent limitations proposed were developed using best professional judgement (BPJ) based on subjective evaluation of the historical effluent characteristics over the 1998-1999 period. The proposed BOD and TSS limits are based on the maximum effluent loading during the past two years with an added buffer to account for the variability in the respective test method. The buffer used is based on twice the standard deviation (as %) associated with each test method as stated in "Standard Methods for the Examination of Water and Wastewater". For BOD, the buffer has been increased in recognition of the greater variability at low BOD concentrations. The facility's recent BOD sampling results have averaged about 10 mg/l.

Resulting BPJ Basis of Limitations:

BOD: April 1998 BOD loading of 910 lbs/day * 1.20 buffer allowance = 1092 lbs/day

TSS: April 1998 TSS loading of 1920 lbs/day * 1.20 buffer allowance = 2304 lbs/day

The proposed monitoring requirements for the next permit cycle are summarized below. They reflect current facility conditions as a converting plant discharging a low BOD effluent on an intermittent basis.

PROPOSED EFFLUENT LIMITS

Biochemical Oxygen Demand (5-day), lbs/day	1092	at least once/ discharge	Grab or Composite
Total Suspended Solids, lbs/day	2304	at least once/ discharge	Grab or Composite
pH	5.0 to 9.0	Continuous	Recording
Temperature	-	Continuous	Recording
Flow (MGD)	-	Continuous	Recording
Production from all activities	-	Daily	Average Daily production

Wastewater Treatment Solids:

The Boise Cascade Vancouver facility has historically landfilled its wastewater treatment solids at the Rufener Landfill located in the Fruit Valley area and permitted by the Southwest Washington Health District. The facility has experimented with recycling these solids as a partial fiber source to the OCC operation of Boise's Wallula, Washington facility. As a converting facility, the Vancouver facility's effluent solids content is so low that solid waste disposal is not a current issue.

Results of Completed Monitoring Requirements:

The facility was required to conduct two effluent characterization studies during the 1995-2000 permit cycle. Annual priority pollutant scans were required to evaluate the chemical composition of the effluent and provide information on chemical composition variability. Whole Effluent Toxicity (WET) testing was also required to assess the acute and chronic characteristics of the effluent. The results of the major studies are as follows:

Priority Pollutant Scans. The facility was required to conduct annual priority pollutant scans for the types of chemicals potentially present in the effluent. The results were used in assessing compliance with human health criteria and water quality criteria. Ecology concluded there was not a reasonable potential for violation of either the human health criteria or water quality criteria based on currently available data.

Whole Effluent Toxicity (WET). The previous NPDES Permit required the permittee to characterize the whole effluent toxicity of the effluent as authorized by RCW 90.48.520 and 40 CFR 122.44 and generally in accordance with procedures in chapter 173-205 WAC. The WET tests were designed to measure the aggregate toxicity of the whole effluent and allow determination of both acute and chronic toxicity. The results of the previous WET testing are summarized in Appendix C of this Fact Sheet.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment. The effluent limit for acute toxicity is no statistically significant difference in survival between the control and the test concentration representing the acute critical effluent concentration (ACEC). The ACEC means the maximum concentration of effluent during critical conditions at the boundary of the zone of acute criteria exceedance assigned pursuant to WAC 173-201A-100. The criteria in the facility's previous permit term for deciding if an acute WET limit was required was a median survival of 80% in 100% effluent. The ACEC in the previous permit cycle equaled 20% effluent.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles.

The criteria for determining if a chronic WET limit is required is a statistically significant difference in response between the control and the ACEC. The ACEC for this discharge is 20%. During the previous permit cycle, the Fathead minnow results all passed the decision criteria but the Ceriodaphnia dubia had three out of the six tests that failed to meet the decision criteria. A reasonable potential to cause chronic conditions in the receiving water had been demonstrated according to chapter 173-205-050(2)(a)(ii)

WAC and, therefore, a chronic limit was required. The effluent limit for chronic toxicity is no statistically significant difference in survival between the control and the test concentration representing the chronic critical effluent concentration (CCEC). The CCEC means the maximum concentration of effluent allowable at the boundary of the mixing zone to WAC 173-201A-100. The CCEC equaled 2.9% effluent in the previous permit cycle.

The acute and chronic WET testing results are summarized in Appendices C and D of this Fact Sheet. Facility effluent last indicated acute toxicity in 1992. Chronic toxicity was last indicated in 1996. No chronic toxicity has been indicated since the 1996 testing. The facility ceased paper making operations in 1996. Current operations as a converting facility generate much less effluent than during the previous permit cycle. As a consequence the acute and chronic dilution ratios have changed. During the previous permit cycle the acute and chronic dilution ratios were 4 and 33 respectively. The acute and chronic dilution ratios based on a maximum daily flow of 6.7 mgd indicative of current facility operations is 4.5 and 82 respectively. The reader needs to be aware that while the design flow for acute criteria is the maximum daily flow, the design flow for chronic criteria is the highest average monthly effluent flow. Thus the approach taken in this permit cycle was to conduct a screening using a "worst case" scenario. The actual design flow for chronic criteria would have been employed had initial screening results indicated the need. This would have resulted in an even larger chronic dilution ratio. No WET limits are proposed for this next permit cycle as the dilution ratios increase, the nature of the effluent is more "benign" and recent testing has not indicated effluent toxicity. The facility will be required to retest the effluent prior to application for permit renewal in order to demonstrate that acute toxicity has not increased in the effluent.

If the Permittee makes process or material changes which, in the Department's opinion, results in an increased potential for effluent toxicity, then the Department may require additional effluent characterization in a regulatory order, by permit modification, or in the permit renewal. Toxicity is assumed to have increased if WET testing conducted for submission with a permit application fails to meet the performance standards in WAC 173-205-020, "whole effluent toxicity performance standard". The Permittee may demonstrate to the Department that changes have not increased effluent toxicity by performing additional WET testing after the time the process or material changes have been made.

Historical Information

Ecology has required studies in previous permit cycles which are not required in the permit currently proposed. Results of past studies are presented below because of perceived continual interest in the study results.

Sediment study. The facility was required to conduct an acute toxicity study of the sediments associated with the facility outfall during the 1990-1995 permit cycle. Ecology also evaluated effluent impact to sediments in February 1993. Samples were collected from upstream, downstream, and at the outfall. Samples were analyzed for metals and chlorinated organics. The metal concentrations were virtually the same at all three locations. Chlorinated organics other than OCDD (Octa-chlorinated dibenzo-p-dioxin) were not detected at any of the three locations. OCDD was not detected upstream or downstream of the outfall but was detected at 16 picograms/gram at the outfall. To interpret the significance of the presence of OCDD in outfall

sediments, Ecology has relied upon EPA guidance summarized in the document titled, "Update of Toxicity Equivalency Factors (TEF) for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDDs and CDFs)". TEFs are variables used to convert the concentration of various dioxin isomers into 2,3,7,8 tetra-chlorinated dibenzo-p-dioxin (TCDD) which is considered a very toxic chlorinated organic. OCDD has been assigned a TEF of 0 and 0.001 under two respective methodologies for deriving TEFs. This means that the toxicity of OCDD in terms of 2,3,7,8-TCDD is considered low. OCDD is not thought to bioaccumulate to the degree that 2,3,7,8 TCDD does. An acute bioassay test of sediment samples indicated no adverse effect on *Hyallela* survival. The sediment bioassay results are as follows:

Hyallela - 10 - day survival test (acute)
(*Hyallela azteca*)

Sample	# tested	Average % Survival
Control	50	88
Sediment #1 (Outfall)	50	94
Sediment #2 (Downstream)	50	92
Sediment #3 (Upstream)	50	98

Ecology's conclusion, based on sediment analysis and bioassay testing of outfall sediments is that the outfall sediments do not pose a threat to human health or the environment. No further sediment studies are proposed for the next permitting term as the facility's environmental impact as a converting facility is expected to be minimal.

Dilution Ratio Study/Dilution Zone Definition. During the 1990-1995 permit cycle the facility was required to determine the dilution ratio of effluent to receiving water at the edge of the dilution zone provided for Outfall 001. The dilution ratio was determined under normal production levels and during critical receiving water conditions. Critical receiving water conditions were defined as 7Q10 which means the 7-day low flow period with a recurrence interval of 10 years. The acute and chronic dilution ratios were calculated to be 4 and 33 respectively. These dilution ratios were derived given the facility's current outfall configuration, effluent flow (8.63 mgd) estimated at the 90th percentile of the daily flow rate, and river flow (105,000cfs) at the 10th percentile of 7Q10 river conditions.

The dilution ratios proposed for the 2000-2005 permit cycle have been adjusted according to the change in effluent flow. The maximum daily effluent flow was 6.7 mgd. The 90th percentile of the effluent flows during the 1998-1999 period is 4.5 mgd. The acute and chronic dilution ratios for the 2000-2005 permit cycle are proposed to be 4.5 and 82 respectively based on modeling using the 6.7 mgd for both acute and chronic modeling. The increases in dilution ratios reflect the decrease in facility effluent flow volume.

Stormwater Study. The permittee was required to conduct a stormwater characterization study on all

stormwater not routed to the wastewater treatment system. Stormwater draining from three warehouse roofs are the only site sources not routed to the wastewater treatment system. The permittee conducted a stormwater characterization of this discharge for the presence of total suspended solids (TSS) and found negligible amounts of TSS. Stormwater from these roofs is discharged to the ground. Permit condition S1.F. specifically allows the treatment of stormwater in the permittee's wastewater treatment system.

Appendix A. Boise Cascade – Vancouver 1998-1999 Effluent Monitoring
History

	Avg day	3OD Max lbs/day	TSS Avg lbs/day	TSS Max lbs/day	Flow Avg Mgd	Flow Max mgd	Temp Avg deg F	Temp Max deg F	pH Avg	pH Max
Jan-98	157	310	404	700	1.5	2.6	42	43	8.2	8.3
Feb	95	160	253	450	1.3	2.2	48	53	8.1	8.1
Mar	135	180	410	560	2	2.7	48	48	8.1	8.1
Apr	497	910	1443	1920	4.1	5.5	57	60	8.4	8.5
May	168	290	490	810	1.7	2.7	60	61	8.2	8.2
Jun	98	105	348	370	1.3	1.4	68	69	8.2	8.5
Jul	0	0	0	0	0	0	NA	NA	NA	NA
Aug	0	0	0	0	0	0	NA	NA	NA	NA
Sept	0	0	0	0	0	0	NA	NA	NA	NA
Oct	190	190	900	900	2.6	2.6	42	42	8.5	8.6
Nov	170	230	610	890	2.2	3.4	34	40	8.3	8.5
Dec-98	215	300	490	890	1.7	3.2	53	58	8.2	8.4
Jan-99	230	345	865	1010	3.3	3.9	47	49	8.3	8.4
Feb	280	390	925	1000	4	4.6	48	49	8.3	8.4
Mar	305	390	543	695	2.2	2.5	56	56	8.3	8.3
Apr	485	485	460	460	2.2	2.2	62	62	8.2	8.2
May	0	0	0	0	0	0	NA	NA	NA	NA
Jun	71	195	180	460	0.8	1.5	69	72	8.2	8.3
Jul	65	65	510	510	2.7	2.7	74	74	7.9	8
Aug	0	0	0	0	0	0	NA	NA	NA	NA
Sept	230	230	900	900	4	4	74	75		
Oct	0	0	0	0	0	0	NA	NA	NA	NA
Nov	365	510	1040	1400	4.4	6.7	55	59	8.2	8.4
Dec-99	160	340	490	870	1.96	3.18	53	54	8.1	8.2
sum=	3756	5285	10771	13925	42	54.4				
avg=	163	230	468	605	1.8	2.4				

Appendix B. Boise Cascade- Vancouver Historical Effluent Information

Year	Total lagoon In 1000 gal ^{note 1}	total lagoon out 1000gal	BOD In #/mo ^{note 2}	BOD Out #/mo	pH out
1999					
Jan	2,258.3	9,784.8	325	695	8.3
Feb	1,877.5	8,017.2	775	560	8.3
Mar	3,512.1	6706.2	615	915	7.7
April	3,092.0	2151.5	625	485	8.2
May	3,147.5	0	460	0	0
June	3,202.1	3,024.9	815	285	8.2
July	1,494.4	2,648.9	232	65	8.0
Aug	2,035.0	0	435	0	-
Sept	1,910.0	4,013.2	515	230	7.5
Oct	1,906.8	0	565	0	-
Nov	5,041.6	17,518.5	1250	1455	8.2
Dec	3,747.7	5,877.2	1695	475	8.1
Total	33,225	59,742	8307	5165	
Ave/mo	2,769	4,978	692	430 ^{note 3}	8.1

Average flow in gallons per day is	92,267	100,000
July, thru August gallons per day	61,218	
Facility storm water flow ave gal.per day	31,049	35,000
Leachate flow ave gal. per day	73,658	75,000
Total BOD to pond #/yr assume 85%		
Pond efficiency 5165/0.15	34,433	35,000
Landfill BOD in leachate #/yr	26,126	25,000
Facility BOD #/yr	8,307	10,000
Ave pH discharge to river		8
Flow events: June and November 4, January and March 3, February 2, April and September 1, May Aug and Sept 0.		

Note 1. Only facility effluent. Does not include effluent from adjacent landfill.

Note 2. Only facility effluent BOD. Does not include landfill effluent BOD.

Note 3. BOD concentration averages about 10 mg/l.

Appendix C. Boise Cascade – Vancouver Acute WET Testing Results as % Survival in 100% Effluent

Lab	Test#	Species	Test date	Protocol	% Survival
ORNAS	PMAR194	<i>Daphnia magna</i>	13-Aug-92	EPAA 91	90%
ORNAS	PMAR195	rainbow trout	13-Aug-92	EPAA 91	0%
ORNAS	PMAR193	fathead minnow*	15-Aug-92	EPAA 91	100%
ORNAS	PMAR204	<i>Daphnia magna</i> *	22-Oct-92	EPAA 91	100%
ORNAS	PMAR203	fathead minnow*	22-Oct-92	EPAA 91	97%
ORNAS	PMAR205	rainbow trout*	22-Oct-92	EPAA 91	97%
ORNAS	PMAR213	<i>Daphnia magna</i> *	10-Dec-92	EPAA 91	100%
ORNAS	PMAR212	fathead minnow*	10-Dec-92	EPAA 91	100%
ORNAS	PMAR211	rainbow trout*	10-Dec-92	EPAA 91	100%
ORNAS	PMAR209	<i>Daphnia magna</i>	25-Feb-93	EPAA 91	93%
ORNAS	PMAR208	fathead minnow	25-Feb-93	EPAA 91	97%
ORNAS	PMAR210	rainbow trout	04-Mar-93	EPAA 91	97%
ORNAS	PMAR199	<i>Daphnia magna</i>	20-May-93	EPAA 91	100%
ORNAS	PMAR198	fathead minnow	20-May-93	EPAA 91	97%
ORNAS	PMAR200	rainbow trout	25-May-93	EPAA 91	100%
ORNAS	PMAR217	<i>Daphnia magna</i>	17-Jun-93	EPAA 91	100%
ORNAS	PMAR216	fathead minnow	17-Jun-93	EPAA 91	97%
ORNAS	PMAR218	rainbow trout	17-Jun-93	EPAA 91	83%
ORNAS	PMAR220	<i>Daphnia magna</i>	15-Jul-93	EPAA 91	93%
ORNAS	PMAR219	fathead minnow	15-Jul-93	EPAA 91	97%
ORNAS	PMAR221	rainbow trout	15-Jul-93	EPAA 91	80%
ORNAS	KJOI634	rainbow trout	24-May-95	WDOE 80	87%
ORNAS	AQTX0585	fathead minnow	16-Nov-95	EPAA 91	95%
ORNAS	AQTX0890	<i>Ceriodaphnia dubia</i>	27-Jun-96	EPAA 91	100%
ORNAS	AQTX1104	rainbow trout	21-Jan-97	EPAA 91	100%
ORNAS	AQTX1295	<i>Ceriodaphnia dubia</i>	19-Jun-97	EPAA 91	100%
ORNAS	AQTX1556	fathead minnow	04-Dec-97	EPAA 91	100%
ORNAS	AQTX1869	rainbow trout	11-Jun-98	EPAA 91	98%
ORNAS	AQTX2249	fathead minnow	08-Dec-98	EPAA 91	100%
ORNAS	AQTX2194	<i>Daphnia magna</i>	25-Jun-99	EPAA 91	100%

- Test duration too short – not valid data

Appendix C. Boise Cascade – Vancouver Chronic WET Test Results as NOEC/LOEC in % Effluent

Test#	Species	Test date	Protocol	End Point	NOEC	LOEC
PMAR192	<i>Ceriodaphnia</i>	13-Aug-92	EPAA 89	survival	100	> 100

		<i>dubia</i>				reproducti on	6.25	12.5
S	PMAR191	fathead minnow	13-Aug-92	EPAF	89	survival	25	50
						growth	25	50
S	PMAR202	<i>Ceriodaphnia dubia</i>	22-Oct-92	EPAF	89	survival	100	> 100
						reproducti on	25	50
S	PMAR201	fathead minnow	22-Oct-92	EPAF	89	survival	100	> 100
						growth	100	> 100
S	PMAR207	<i>Ceriodaphnia dubia</i>	25-Feb-93	EPAF	89	survival	100	> 100
						reproducti on	100	> 100
S	PMAR206	fathead minnow	25-Feb-93	EPAF	89	survival	100	> 100
						growth	100	> 100
S	PMAR197	<i>Ceriodaphnia dubia</i>	20-May-93	EPAF	89	survival	100	> 100
						reproducti on	12.5	25
S	PMAR196	fathead minnow	20-May-93	EPAF	89	survival	100	> 100
						growth	100	> 100
S	PMAR215	<i>Ceriodaphnia dubia</i>	17-Jun-93	EPAF	89	survival	100	> 100
						reproducti on	100	> 100
S	PMAR214	fathead minnow	17-Jun-93	EPAF	89	survival	100	> 100
						growth	100	> 100
S	PMAR223	<i>Ceriodaphnia dubia</i>	15-Jul-93	EPAF	89	survival	100	> 100
						reproducti on	12.5	25
S	PMAR222	fathead minnow	15-Jul-93	EPAF	89	survival	100	> 100
						growth	100	> 100
S	KJOI679	fathead minnow	15-Jun-95	EPAF	89	survival	20	> 20
						growth	20	> 20
S	AQTX0584	<i>Ceriodaphnia dubia</i>	14-Nov-95	EPAF	89	survival	100	> 100
						reproducti on	100	> 100
S	AQTX0889	fathead minnow	25-Jun-96	EPAF	94	survival	100	> 100
						growth	100	> 100
						biomass	100	> 100
S	AQTX1103	<i>Ceriodaphnia dubia</i>	10-Dec-96	EPAF	94	survival	100	> 100
						reproducti on	10	20
S	AQTX1294	fathead minnow	19-Jun-97	EPAF	94	survival	20	50
						growth*	2.9	10
						biomass	20	50

S	AQTX1557	<i>Ceriodaphnia dubia</i>	04-Dec-97	EPAF 94	survival	100	> 100
					reproducti on	20	50
S	AQTX1870 BO	fathead minnow	11-Jun-98	EPAF 94	survival	100	> 100
					biomass	100	> 100
M	AQTX2248	<i>Ceriodaphnia dubia</i>	08-Dec-98	EPAF 94	survival	100	> 100
					reproducti on	50	100
S	AQTX2193 BO	fathead minnow	18-Jun-99	EPAA 91	survival	100	> 100
					biomass	100	> 100
M	AQTX2251	<i>Ceriodaphnia dubia</i>	09-Dec-99	EPAF 94	survival	50	100
					reproducti on * anomalous	25	50